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*This object is achieved by the features of claim 1 (method claim) and by the features of claim 11 (apparatus claim). Advantageous developments of the method and the apparatus are evident from the corresponding dependent claims.

In the claims:

1.(Currently amended) A method for examining structures on a semiconductor substrate

(7) that has a thickness, the method comprising:

penetrating and imaging of the structures with X-radiation (1) in an imaging X-ray microscope onto a spatially resolving detector (9,12); and

establishing of a wavelength or a wavelength region of the X-radiation as a function of the thickness of the semiconductor substrate (7) in such a way that the transmission of the X-radiation through the semiconductor substrate (7) is at least sufficient for detection of the X-radiation and for obtaining a high-contract contract image.



- 2.(Currently amended) The method as defined in Claim 1, further comprising reducing the thickness of the semiconductor substrate (7) without affecting the structures.
- 3.(Currently amended) The method as defined in Claim 1, wherein the semiconductor substrate (7) is made of silicon, the substrate thickness is less than 30 μ m, and the X-radiation has a wavelength between 0.1 nm and 2 nm.
- 4. (Currently amended) The method as defined in Claim 1, wherein the wavelength of the X-radiation is selected in accordance with the Rayleigh-Gans algorithms for scattering to provide an optimum X-ray optical scattering capability for the structures on the substrate (7) in order to obtain a the high-contrast image with a high signal-to-noise ratio.
- 5. (Currently amended) The method as defined in Claim 1, wherein the wavelength of the X-radiation selected for the examination of metal structures on the substrate (7) is in the a vicinity of the corresponding absorption discontinuities of the metals, resulting in a the high image contrast.

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- 6. (Currently amended) The method as defined in Claim 1, wherein the X-radiation impinges upon the semiconductor substrate (7) at a side containing no structures.
- 7. (Currently amended) The method as defined in Claim 1, wherein the structures are imaged at different observation angles in order to allow stereographic and tomographic reconstructions.
- 8. (Currently amended) The method as defined in Claim 1, wherein the X-ray microscope is operating in phase contrast to provide a minimum number of photons and minimal exposure time for obtaining an image.
- 9. (Currently amended) The method as defined in Claim 1, wherein a segmented phase plate (2a, b, e) is used in the a back focal plane of the an X-ray objective.
- 10. (Currently amended) The method as defined in Claim 9, wherein a segmented stop (29) disposed between an X-ray source and a condenser (3) of the X-ray microscope is used.
- 11. (Currently amended) The method of Claim 10, wherein a segmented annular condenser zone plate (19), or a rotating condenser (13) having a chopper disk, is used as the condenser (3).
- 12. (Currently amended) An imaging X-ray microscope for examining structures on a semiconductor substrate (7) having a thickness, the X-radiation microscope comprising:

an objective (8) for imaging the structures with X-radiation on a spatially resolving detector (9, 12); and

an X-radiation source (1a) generating the X-radiation having a wavelength which is a function of the thickness of the semiconductor substrate (7), wherein transmission of the X-radiation through the semiconductor substrate (7) is at least sufficient for detection of the X-radiation, and for obtaining a high-contrast image.



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- 13. (Currently amended) The imaging X-ray microscope as defined in Claim 12, wherein a segmented phase plate (20) is disposed in a back focal plane of the X-ray objective (8).
- 14. (Currently amended) The imaging X-ray microscope as defined in Claim 13, wherein a segmented stop (29) is disposed between the X-radiation source and a condenser (3) of the X-ray microscope.
- 15. (Currently amended) The imaging X-ray microscope as defined in Claim 14, wherein a segmented annular condenser zone plate (19) or a rotating condenser (13) having a chopper disk is provided as the condenser (3).

